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Alfieri

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(54) **HAND ACCESS DEVICE**

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(51) **Int. Cl.**
A61B 17/34 (2006.01)
A61B 17/00 (2006.01)

(52) **U.S. Cl.**
CPC .. ***A61B 17/3423*** (2013.01); *A61B 2017/00265* (2013.01); *A61B 2017/3429* (2013.01)

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USPC 600/202–215; 604/167.04, 167.06; 606/108, 191, 213
See application file for complete search history.

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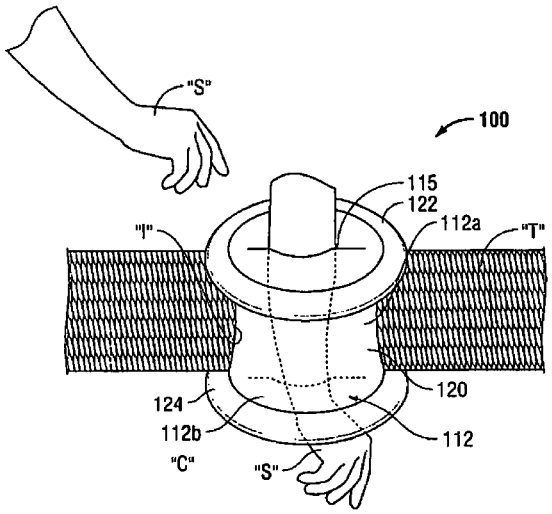
(57) **ABSTRACT**

A device for accessing a body cavity through an opening in tissue is provided. The access device includes a unitary compressible body configured to be received in an opening in tissue. The compressible body includes a central portion, an upper rim located on a proximal end of the body and a lower rim located on a distal end of the body. The central portion defines a slit configured to permit the passage of a hand therethrough in a sealing manner.

6 Claims, 3 Drawing Sheets



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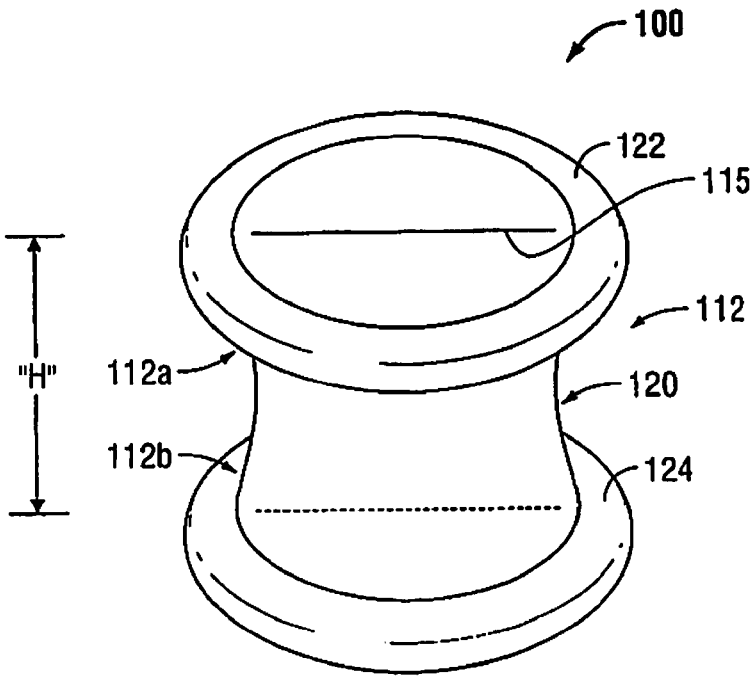

FIG. 1

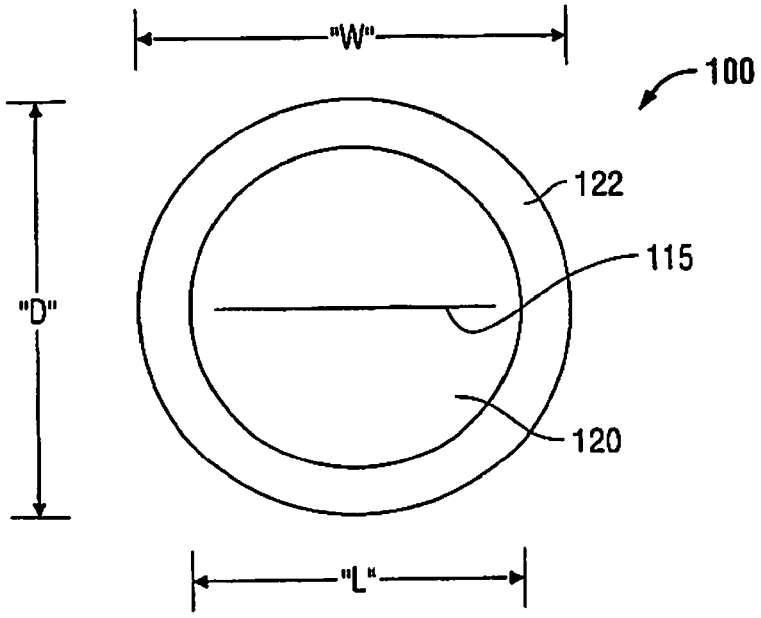

FIG. 2

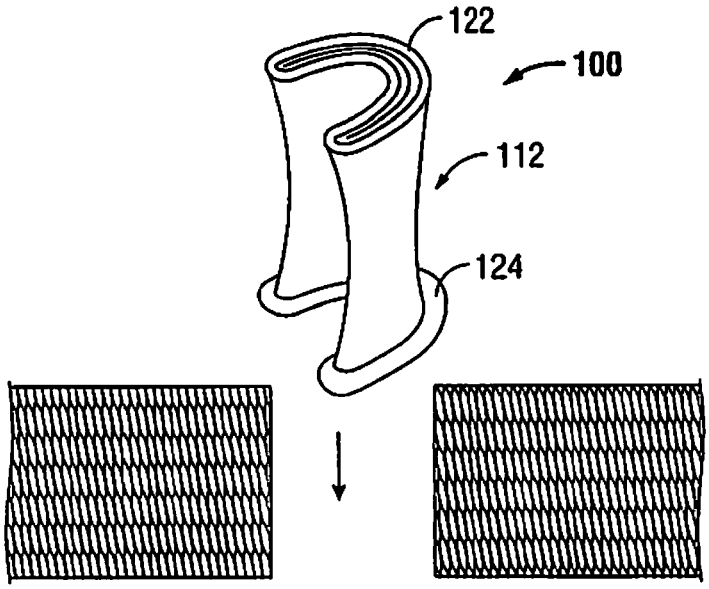

FIG. 3

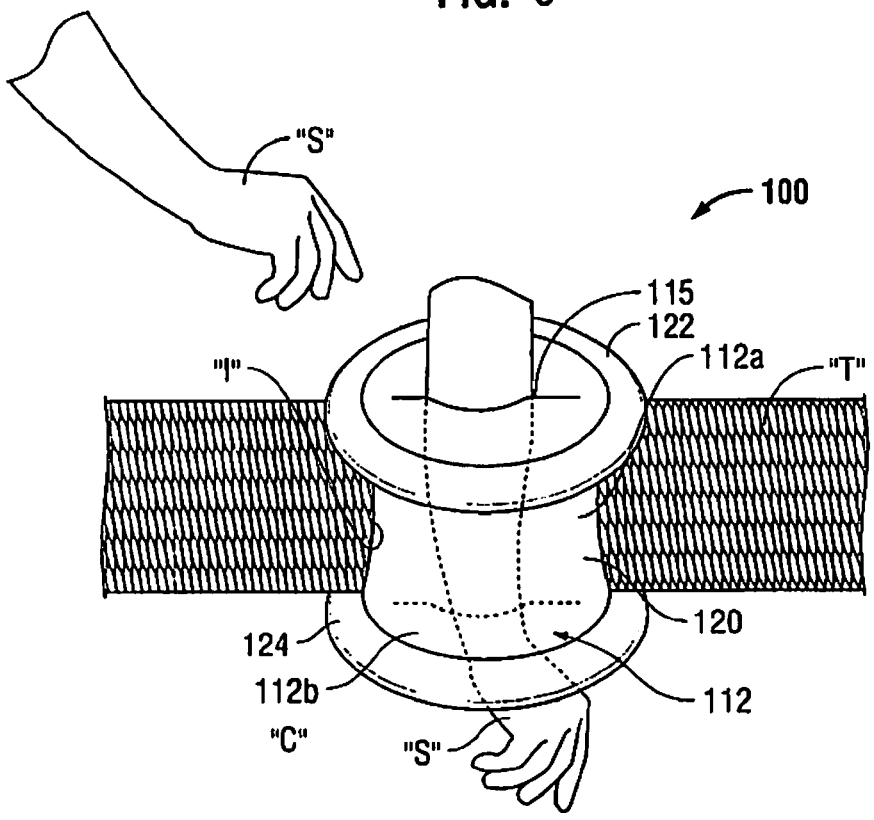

FIG. 4

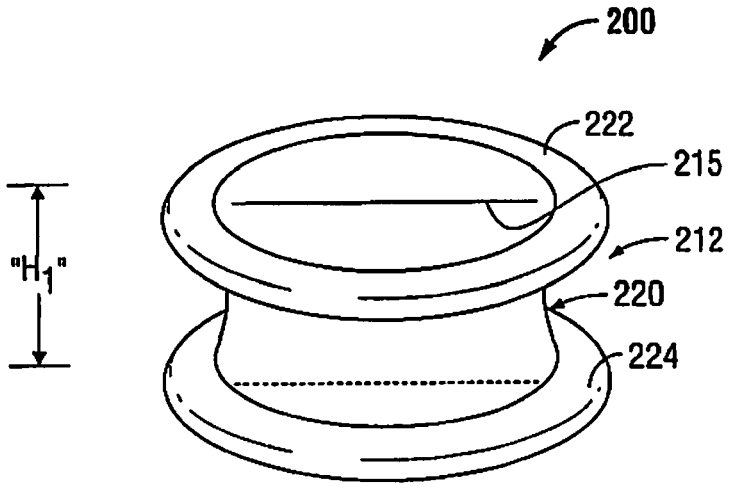

FIG. 5

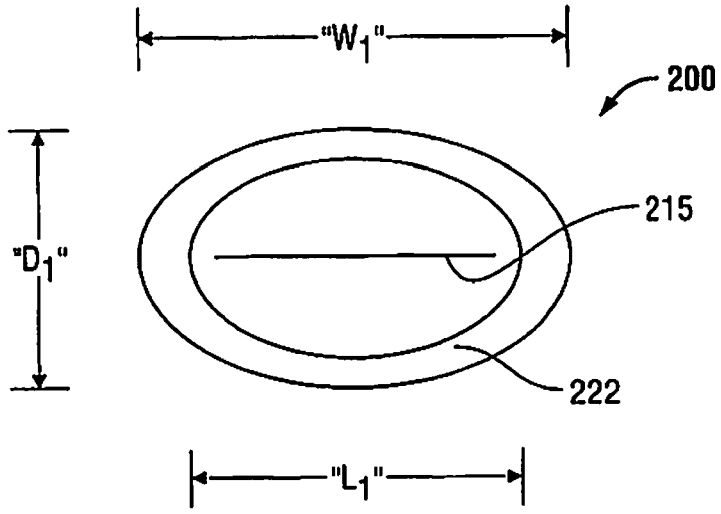

FIG. 6

HAND ACCESS DEVICE

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. application Ser. No. 13/223,659 filed Sep. 1, 2011, which claims benefit of Provisional application No. 61/424,761 filed Dec. 20, 2010, and the disclosures of each of the above-identified applications are hereby incorporated by reference in their entirety.

BACKGROUND

1. Technical Field

The present disclosure relates to access devices for use in surgical procedures. More particularly, the present disclosure relates to compressible access devices configured for sealed receipt of a hand therethrough.

2. Background of Related Art

Access assemblies configured for reception through an opening or incision into a body cavity are known, as are methods of inserting the access assemblies therethrough. Traditional access assemblies include a rigid cannula that is received through the tissue of the body wall into the body cavity. Endoscopic, laparoscopic and other suitable instruments may then be directed through a housing located on the proximal end of the cannula to access the body cavity in a sealing manner.

Compressible devices or assemblies configured for accessing a body cavity and permitting reception of instruments therethrough in a sealing manner are also known. Such compressible assemblies are composed of silicone, thermoplastic elastomers (TPE), rubber, foam, gel and other compressible materials and are configured to be compressed to facilitate insertion into an incision. Typically, such assemblies are deformed by a surgeon using his/her fingers or with the assistance of a grasping device, i.e., forceps. Compression of the assembly reduces the profile of the assembly, thereby facilitating reception of the assembly into the incision. Upon release of the compressive force, the previously compressed assembly returns to an uncompressed configuration. One or more endoscopic or laparoscopic devices may then be inserted through one or more lumens in the assembly to complete a procedure.

Although advances have been made with regards to endoscopic and laparoscopic instrumentation, there is still no comparison to the dexterity and feel of one's hand. Being able to access a surgical site with a hand enables a surgeon to perform procedures that he/she would not otherwise be able to perform during a closed procedure. Thus, any procedure performed with hand access more closely resembles an open procedure, which a surgeon may be more comfortable performing.

Therefore, it would be beneficial to have a compressible access device which provides hand access for a surgeon.

SUMMARY

The present invention, in accordance with an embodiment thereof, relates to an access device comprising a unitary, compressible body configured to be received in an opening in tissue, the compressible body including a central portion, an upper rim located on a proximal end of the body and a lower rim located on a distal end of the body, wherein the central portion defines a slit configured to permit the passage of a hand therethrough in a sealing manner. The compressible body may define a substantially hour-glass shape. The upper and lower rims and the central portion may be substantially circular or substantially oval. The upper and lower rims may be substantially similar. The opening in the tissue may be an incision or a natural orifice. Each of the upper and lower rims may include a width of four inches (4") and a depth of four inches (4"). Alternatively, each of the upper and lower rims may include a width of four inches (5") and a depth of four inches (3"). The slit may include a length of at least two and one-half inches (2.5"). The compressible body may be composed of silicone, thermoplastic elastomers (TPE), rubber, foam and/or gel.

DESCRIPTION OF THE DRAWINGS

Embodiments of a compressible access device are disclosed herein with reference to the drawings, wherein:

FIG. **1** is a perspective view of an embodiment of an access device according to the present disclosure;

FIG. **2** is a top view of the access device of FIG. **1**;

FIG. **3** is a perspective view of the access device of FIGS. **1** and **2**, in a compressed condition prior to insertion through an incision;

FIG. **4** is a perspective view of the access device of FIGS. **1-3**, selectively secured within an incision;

FIG. **5** is a perspective view of an access device according to an alternative embodiment of the present disclosure; and

FIG. **6** is a top view of the access device of FIG. **5**.

DETAILED DESCRIPTION

Embodiments of the presently disclosed access device will now be described in detail with reference to the drawings wherein like numerals designate identical or corresponding elements in each of the several views. As is common in the art, the term "proximal" refers to that part or component closer to the user or operator, i.e. surgeon or physician, while the term "distal" refers to that part or component further away from the user. Although the access devices of the present disclosure will be described as relates to accessing an abdominal cavity through an incision in the abdominal wall, the access devices of the present disclosure may be modified for use in other closed procedures, i.e., laparoscopic, arthroscopic, endoscopic. Furthermore, the access devices of the present disclosure may be modified for use in accessing internal cavities through natural orifices, e.g., anus, vagina.

Referring initially to FIG. **1**, an access device according to an embodiment of the present disclosure is shown generally as access device **100**. Access device **100** is configured for insertion through an opening in tissue, i.e., an incision, such that after insertion, access device **100** creates a seal within the opening through which a surgeon may insert and manipulate his/her hand "H" (FIG. **4**) and/or one or more surgical instruments (not shown) to complete a procedure.

With reference to FIGS. **1** and **2**, access device **100** includes a substantially compressible and/or flexible body **112**. Body **112** may be formed of various materials, such as, for example, silicone, thermoplastic elastomers (TPE), rubber, foam, gel, etc. In one embodiment, body **112** includes a TPE material that is infused with an inert gas, e.g. CO_2 or Nitrogen, to form a foam structure. Body **112** may be coated with a lubricant, e.g. Parylene N or C, in order to create a lubricious outer surface. Various other coatings, e.g., hydrophilic, hydrophobic, bio-agents, anti-infection, analgesic, may also be employed to improve the characteristics of access device **100** or to adapt access device **100** for a specific procedure.

With reference still to FIGS. **1** and **2**, body **112** includes a substantially cylindrical central portion **120**, an upper rim **122** located on a proximal end **112***a*, and a lower rim **124** located at a distal end **112***b*. In this manner, body **112** defines a substantially hourglass shape when viewed from the side. Upper and lower rims **122**, **124** are integrally formed with central portion **120** and define substantially annular members. Central portion **120** is configured to span the thickness of tissue "T". Upper and lower rims **122**, **124** aid in preventing movement of access device **100** longitudinally through incision "I" once access device **100** has been properly received therethrough. As the thickness of tissue depends on the body composition of the patient and the location through which the underlying cavity is being accessed, the length and size of access device **100**, generally, and central portion **120**, specifically, may be modified to suit a given procedure. In this manner, an adult patient having fatty abdominal tissue requires an access device having a longer central portion **112** then an access assembly sized for an child.

Still referring to FIGS. **1** and **2**, body **112** defines a slit **115** extending longitudinally therethrough. Slit **115** extends the length of body **112** and provides a resealable opening through which a hand "H" of a surgeon may be passed. As shown, slit **115** spans substantially the width of central portion **120**. Body **112** is configured such that hand "H" may be passed through slit **115** of access device **100** while maintaining an insufflation gas within a body cavity "C". In this manner, body **112** of access device **100** forms a seal about the hand and lower arm of the surgeon, to permit sealed passage of hand "H" therethrough. Body **112** may include a coating about slit **115** to prevent tearing and/or to facilitate reception of hand "H" therethrough.

With reference still to FIGS. **1** and **2**, body **112** of access assembly **100** defines a substantially hourglass shape having a height "H". Upper and lower rims **122**, **124** each define substantially circular members having a width "W" and a depth "D". As shown, each of upper and lower rims **122**, **124** have similar sizes and shapes, however, it is envisioned that rims **122**, **124** may differ in size and/or shape. Slit **115** defines a planar opening spanning a length "L" of central portion **120**. The size of access device **100** is needed to be large enough to permit passage of hand "H" through slit **115** without tearing of body **112**, however, access device **100** should not be so large as to create an unnecessarily large opening in tissue "T" of the patient that may be difficult to close and/or may leave a decidedly large scar. As the size of a hand "H" differs from surgeon to surgeon, access device **100** may be provided in various sizes to accommodate the surgeon. In one embodiment, width "W" and depth "D" of first and second rims **122**, **124** and height "H" of body **112** each measure between three inches (3") and five inches (5"), and preferably, four inches (4"). In the same embodiment, slit **115** includes a length "L" of at least two and one-half inches (2.5").

The use of access device **100** will now be described with reference to FIGS. **3** and **4**. The following discussion will include the use of access device **100** for accessing a body cavity "C" through an incision "I" in tissue "T". As discussed above, access device **100** may be used for accessing various cavities or lumen through other openings, including naturally occurring orifices, e.g., anus.

Referring initially to FIG. **3**, an incision "I" is created in tissue "T" through which access device **100** is to be inserted to access body cavity "C". Body **112** of access device is then compressed to reduce the profile of access device **100**. This may be accomplished by hand or instead, through the use of an insertion mechanism (not shown). By reducing the profile of access device **100**, access device **100** may be more easily inserted through incision "I".

Turning to FIG. **4**, once received through incision "I", body **112** of access device **100** is permitted to return to an initial, uncompressed condition. Decompression of access device **100** causes access device **100** to expand within incision "I", thereby effectively sealing body cavity "C". Once sealed, body cavity "C" may be insufflated and access device **100** operates in a manner similar to traditional access assemblies configured for use with surgical instruments.

Removal of access assembly **100** from within incision "I" occurs in the reverse order of insertion. Body **112** is once again compressed to reduce the profile of access device **100**. Once compressed, access device **100** may be readily withdrawn from incision "I". Once access assembly **100** is removed from incision "I", incision "I" is closed in a conventional manner, i.e., sutures, staples.

Turning now to FIGS. **5** and **6**, an access device according an alternative embodiment of the present disclosure is shown generally as access device **200**. Access device **200** is substantially similar to access device **100** described hereinabove, and will only be described as relates to the differences therebetween. Access device **100** includes a body **212** having a central portion **220**, an upper rim **222** located on a proximal end thereof and a lower rim **224** located on a distal end thereof. Body **212** defines a slit **215** extending longitudinally through central portion **220**. Each of upper and lower rims **222**, **224** and central portion **220** define substantially oval members. The oval shape of upper and lower rims **222**, **224** and central portion **220** permits a longer slit **215**. In this manner, access device **200** is configured to more readily accommodate passage of hand "H". Upper and lower rims **222**, **224** have a width "W_1" and a depth "D_1". Body **212** includes a height "H_1" and slit **215** includes a length "L_1". In one embodiment, upper and lower rims **222**, **224** include a width "W_1" of about five inches (5") and a depth "D_1" of about three inches (3"), body **212** includes a height "H_1" of about three and one-half inches (3.5") and slit **215** includes a length "L_1" of about three inches (3").

It will be understood that various modifications may be made to the embodiments disclosed herein. For example, either or both of the upper and lower rims and the central portion may include selectively inflatable cavities configured to facilitate insertion and removal of the access device through an incision. Therefore, the above description should not be construed as limiting, but merely as exemplifications of particular embodiments. Those skilled in the art will envision other modifications within the scope and spirit of the claims appended hereto.

The invention claimed is:

1. An access device for insertion through an opening in tissue, the access device comprising:

a body formed of a foam material, the body having:

a central portion with a proximal end and a distal end;

an upper rim located on the proximal end of the central portion; and

a lower rim located on the distal end of the central portion,

at least one of the upper rim or the lower rim having an oval cross-section relative to a longitudinal axis of the body when the body is in an at-rest state, the at least one of the upper rim or the lower rim defining a major axis and a minor axis, the body transitionable between a compressed condition adapted to facilitate insertion thereof through the opening in the tissue and an uncompressed condition adapted to secure the

body within the opening in the tissue in a sealing relation, the at least one of the upper rim or the lower rim defining a slit between the upper and lower rims of the body, wherein the slit extends a substantial length of the at least one of the upper rim or the lower rim along the major axis, the slit extending between proximal and distal ends of the body.

2. The access device according to claim **1**, wherein the central portion includes an oval cross-section.

3. The access device according to claim **1**, wherein the body defines an hourglass shape.

4. The access device according to claim **1**, wherein the upper and lower rims are integrally formed with the central portion.

5. The access device according to claim **2**, wherein the central portion has the oval cross-section when the body is in the at-rest state.

6. The access device according to claim **1**, wherein the oval cross-section of the at least one of the upper rim or the lower rim is transverse to the longitudinal axis of the body.

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